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Upcycling as a design strategy for product lifetime optimisation and societal change

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Abstract: Designers and product developers are currently being called upon to take greater responsibility for the problems presented by the inefficient and unsustainable systems used to create new fashion items. The culture of transience, newness and perceived obsolescence, so prevalent in the fashion industry, has led to growing over-consumption and consequentially high volumes of waste. In fact, clothing is often disposed of with as much as 70% of its potential lifetime still left.

Upcycling seeks to provide a transitional solution to the textile waste problem, by optimising the lifetimes of discarded products from an inefficient system, as technology moves to develop more sustainable approaches. As a design based waste solution, upcycled fashion production utilises textile waste to create products with a higher retail value than traditionally recycled goods.

This paper aims to analyse the innovative ways in which UK based upcycling designers are recreating style and value from discarded materials, and the benefits of this process. The author's own design process, as a UK based upcycling designer, was documented and examined. Challenges and solutions to upcycled production were then further investigated through structured interviews and observational field trips with leading UK based upcycling practitioners.

The practical implications of this research include the development of an innovative, UK based sustainable design and production approach, which directly tackles the issue of textile waste and offers scope for further employment and training within the industry. Social implications include recommendations on how best to engage with the public on environmental issues in the apparel industry, and the wider implications of these issues.

Introduction

Morgan and Birtwistle (2009) and DEFRA (2009) have cautioned that UK landfill space is to run out in less than 10 years, and methane emissions created by the biodegradable waste at these sites, such as natural fibres used in clothing, are 21 times stronger than CO2 as a green-house gas. 3.1 million tons of CO2 is produced by the fashion and textiles industry every year in the UK, as well as 20 million tons of waste water (Minney, 2011). According to RockstrÖm (2009) the safe planetary boundary of 350 ppmv of atmospheric CO2 has already been exceeded globally, and currently stands at 387 ppmv. The effects of this are threats to ecological life-support systems through global warming and polar ice loss.

The UK alone discarded approximately 2.35 million tons of clothing and textile waste in 2006 (Allwood, Laursen, Malvido de Rodriguez, & Bocken, 2006). Fletcher (2008) calculated that this equates to around 40kg of textiles waste per person in the UK, of which 74% (around 30kg per person) is sent to landfill, with 13% sent to incineration and only 13% sent to material recovery. The majority of recovered textile items are currently exported for reuse (Bartlett, McGill, & Willis, 2013). Once collected, post-consumer textiles are processed and sorted; an activity requiring skilled workers to identify and separate wearable textiles, and differing properties in un-wearable textiles, ready for recycling. One facility for handling such activity is Oxfam's

Wastesaver plant, which handles over 100 tons of textiles a week (Waste Online, 2010).
In a study by Farrant et al. (2010) the route of donated second hand clothing (SHC) is defined hierarchically, with the best pieces being resold in western markets, lower quality items exported to Eastern Europe and Sub-Saharan Africa, and the least good recycled, incinerated or thrown into landfill. The countries of Sub-Saharan Africa received close to 30% of world exports of SHC in 2001. These imports carried a total value of $405 million, up from $117 million in 1990 (Hansen, 2004). The textile reprocessing industry is however in a state of flux, as quality is reducing and volumes are increasing, creating financial imbalance.

Considering a new t-shirt (weighing approximately 250g) costing £2.65 wholesale in 2006 (Allwood et al., 2006), and allowing for inflation, around £3.35 in 2014 (Bank of England, 2014); with roughly 4000 new t-shirts in 1 tonne, new garments have an approximate value of around £13,400 per tonne (£13.40 per kg) and upwards. Bartlett, McGill, and Willis (2013) estimate that the average revenue received for a tonne of SHC & textiles is £917. Purchasing these textiles and sorting them costs a reprocessor approximately £650 per tonne, leaving just £267 profit per ton of used textiles sold.
The concept of upcycling presents an opportunity for designers to lead the way forward, in sustainably utilising the many tons of textile waste produced to create increased value and satisfy the constant demand for new fashion, while technological developments advance towards more sustainable methods of production. Consumer appetite for newness has led to the current situation of over-consumption and over-production, resulting in waste, pollution and harmful emissions, as well as a depletion and exploitation of natural resources. High volumes of textile waste have been viewed as the end of the line for those discarded garments; however, the fashion industry could be utilising this resource to create well designed and sustainably sourced upcycled clothing.

Methodology

In this qualitative study, a constructionist approach to research was taken, which has enabled the research to investigate the ways in which individuals and groups participate in the construction of an upcycling process as part of their practice. Qualitative research methods were used as the study chiefly deals with participants' views of their own practice. An inductive approach was used to develop insights in order to propose hypotheses and shape theories derived from the qualitative data collected (Bryman, 2008).

The first author's own professional practice in creating upcycled denim fashion products was also documented in order to gain a deeper understanding of this process and to assess its effectiveness against the current practice of other upcycling practitioners. This information was then further developed by using data from interviews carried out with five UK based upcycled fashion practitioners and designers, and one UK high street fashion label, involved in the area of social responsibility. This information enabled the identification of design and production related issues faced by upcycled women's wear producers in the UK.
Focus groups were used to gain qualitative information on consumer attitudes, behaviour, perceptions and habits. As a semi-structured, open ended interview technique, focus groups are suitable for situations in which asking questions with a general idea of topic and rough notion of sequence are known, but not fully specified in advance (Jankowicz, 1995).

Sample Selection

The high street label chosen for the study was from a brand which had expressed an active corporate social responsibility policy as a member of the Ethical Trading Initiative. The upcycling brands involved in the study represented the mixed range of UK fashion upcycling, from higher profile labels that have shown regularly on and off schedule at London Fashion week, to smaller labels, which produced limited collections for loyal customer bases, mainly reached through social media.

75% of consumer focus group participants were in 16 to 35 age range, and could be categorised as being from the 'Fashion Surfers' and 'Product Wanters' categories of shoppers of young women who shop for leisure and have their own disposable income or budget for clothes. 25% of participants were in the 15 to 55 and also shopped for leisure with their own disposable income (Mintel, 2008; Monk and Mintel, 2011).

Data Analysis
Data gathered through consumer focus groups and interviews with designers was analysed using content analysis techniques as outlined by Jankowicz 1995; Grbich 2007 and Flick 2011. These methods of content analysis enabled the identification of key areas for consideration in upcycled fashion design, and permitted the development of hypotheses and the conceptual model. Qualitative data analysis software NVIVO was used to facilitate this method of analysis.

Findings: Standard Fashion Design

High Street Fashion Design Process
A knitwear designer from a high street fashion brand was interviewed as part of the research, and the design process within this high street fashion organization derived from this data. The process is as follows in Figure 1.

The high street design process investigated for the study indicated that the designer's role at this brand had clearly defined limits of research, design and sample production, and did not extend beyond this remit. Unrestricted and trend-led yarn and fabric choices were made at trade shows, through suppliers and factories, with no sustainable options requested or offered. In the production and sample stages the designer would oversee the production of a prototype sample, then a second stage, followed by a final garment. This garment was then fit tested, signed off and sealed up to be passed along to the next stage in the design and production process. This process aligns with the first stage of the summarized process, in which a brief is set, research is carried out and designs and samples are created.

Standard Fashion Design and Production Process
In each of the design models examined, the process is often initiated with a brief, which outlines the design task or problem. This is then followed by research of the market and of the creative aspects of the range to be produced. The design process or synthesis phase is where the problems are solved and possible solutions ideated. This is followed by the making of sample products, which form the basis for promotion and marketing, before the products are manufactured and distributed to retailers, ready for consumers. Based on processes outlined by McKelvey and Munslow (2003); Jenkyn Jones (2005); Burke (2008); Matharu (2010) and Armstrong and LeHew (2011) a summarised design and production process model has been created and is shown in Figure 2.

Abbreviated Standard Fashion Design Process Model
From the summarised model in Figure 2, showing details of activities which occur at each stage, an abbreviated process model in Figure 3 has been created to clearly show the main stages in standard fashion design and production, including fabric sourcing. This model will be used for comparison to the upcycling model created from further data in the research.

Findings: Upcycled Fashion Design

Upcycled Denim Wear Process
An upcycled denim wear process was documented for the purposes of evaluating the main design and production concerns faced by upcycled women's wear production in the UK. This collection utilizes discarded second hand denims, diverting this waste from landfill, to create designer-maker fashion products which are sold at a specialist boutique in Manchester, and through one-off events such as 'The Clothes Show Live' and off-schedule London Fashion Week at events such as 'The Good Fashion Show'. From this research, an initial upcycling process model was created for denim wear in Figure 4.

Upcycled Fashion Design and Production Process
Five UK-based upcycling designers were interviewed to gain insights into the issues they faced in terms of sourcing, design, production, retail and promotion. The results from this research were combined with those from the denim wear documentation and used to further inform and develop an upcycled fashion design process model in Figure 5 (a & b).

Abbreviated Upcycled Fashion Design and Production Process Model
Following on from the development of the upcycled design and production process model in Figure 5 (a & b), detailing activities which occur at each stage of the process, an abbreviated upcycling process model has been created in Figure 6, showing fabric sourcing as it occurs at the second stage in the process. Key issues in sourcing for upcycling were consistency, quality, quantity and sorting, with

local sourcing of either post-consumer or post-industrial waste textile favoured. Designs were created using traditional fashion design techniques of sketches, mood-boards and sample making, but techniques such as 'patchwork' pattern cutting created smaller pattern pieces to best utilise all available source materials. Seasonal designs often evolved slowly, taking consumer feedback into consideration.

Production was often outsourced to meet wholesale orders, which were essential to the financial success of each label. Several variations on modular manufacturing were employed and relied on well planned production schedules and highly competent makers. Deconstruction was considered too time consuming, leading to a price increase for consumers, who were able to access upcycled designs through e-commerce sites and specialist boutiques. Favoured promotional tools were social media and websites, allowing designers to identify themselves with distinctive branding and styling. Trade shows featured highly as effective means to gain wholesale orders, and celebrities were mentioned as editorial and headline grabbing promotional considerations.

Collaborations and consultancies with larger brands enabled designers to promote their labels though media coverage and to implement sustainable design strategies with high profile retailers. Community engagement projects and involvement with education enabled designers to raise the profile of their brands; and to facilitate public understanding of sustainability issues with the apparel industry. The sustainability ethos of each brand, which encompassed reducing consumption, diverting textiles from the waste stream and supporting local communities; ran through every aspect of their design and production process as a common thread.

Findings: Consumer Perspectives

In order to evaluate the main consumer related issues faced by upcycled womenswear production in the UK, three consumer focus groups were interviewed to gain insights into the attitudes, perceptions and behaviours displayed concerning wardrobe, shopping, fashion, style and sustainability. This qualitative data informed the final analysis of all the results pertaining to the upcycling process proposed in this research.

Wardrobe and Shopping Habits

Dresses were found to be garment of choice to wear and to purchase, and versatility was found to be a key quality for wardrobe items amongst all the consumers. Style and price were the most important considerations for making a purchase. Shopping was often cited as a leisure activity, treat or emotional boost, with high street, vintage, charity and online stores favoured amongst the demographic sampled. Online shopping was often favoured by consumers who had negative experiences of high street shopping. Trends were also viewed negatively; however style and high fashion were more highly rated.

Perception of Fashion and Upcycling

Sustainable fashion held associations of very basic and uninteresting styles for many; with additional negative associations of 'hempy' and 'hippie' styles. Confusion over terminology and labelling was a frequent theme throughout each of the focus groups and more clarity was called for by consumers. Upcycling was a term most consumers were familiar with, in terms of re-working post-consumer garments. Consumers felt that if the style, price and clear labelling of upcycled styles were all present then purchasing would be probable. Internet promotion and features in regular fashion magazines were felt to be the most effective methods communicating ethical fashion information to consumers; integrating sustainable apparel alongside regular fashion and increasing the accessibility to all consumers.

For consumers, accessibility seemed to be an important factor for eco-fashion purchases, and it was felt that if it were offered alongside regular fashion, on the high street, in shops, concessions and in magazines, and integrated alongside these regular fashion choices as a viable alternative, they would be more inclined to buy.

Discussion and Analysis

Figure 7 was created to identify points of divergence between standard fashion design and production and upcycled fashion design and production processes. The main differences between the standard design process and upcycling process occur at the

fabric sourcing stages. Key differences also occur in the retailing of upcycled fashion products to consumers with an understanding of their ecological provenance.

Fabric sourcing occurs early on in the upcycling process, immediately after the brief is set. Often the brief is directly connected to sourcing, and relates to the production of a fashion collection utilising textile waste. This is in contrast to the standard design process, where fabric purchasing occurs as a pre-production stage much later on, after research, design and orders are taken. A restricted choice in upcycling, sourcing solely from pre-existing textiles not only limits the quantities of waste directed towards landfill, but utilises a source material which does not rely on the production of virgin materials or any further heavy processing.

Designers within an upcycling organisation take on a highly centralized role, in which they either directly oversee or actively perform all duties from sourcing, design and production, through to promotion and retail. Upcycling brands and retailers make their relationship with consumers a priority; offering events which engage consumers in the ethos and lifestyle of sustainable fashion. Upcycling brands often strengthen this relationship with consumers by including interactive social media as a key element of their promotional strategies, along with a strong online presence through their own e-commerce sites.

Conclusions

The results of this study demonstrate that there are significant differences between upcycled and standard fashion and design and production processes. For effective upcycled fashion design to occur, specific considerations need to be made as part of the design and production schedule. Fabric sourcing must occur much earlier on in the process than in standard design and production, and pattern cutting techniques must take into account inconsistencies in supply with interchangeable fabric options. It is necessary for information on the availability of source materials to be on hand from the outset, in order to achieve consistency of design throughout production.

The benefits of upcycling include using waste as a source material, diverting it from landfill, and in doing so reducing carbon emissions and other negative environmental impacts. This creates a cost effective reuse of scarce resources and the embodied energy contained from initial manufacture. Upcycling provides opportunities for further training and education in the fashion and textiles industry. Employment in this sector is currently dominated by retail, with declining provision for training in areas such as manufacturing and entrepreneurship (British Fashion Council, 2010; Skillset Textiles, 2010) . The UK has the chance to fill in skills gaps currently faced by new entrepreneurs with the provision of training within upcycling businesses. Upcycling also supports economic localization, by utilizing locally sourced materials, work force and skills, plus adding to the development of local communities by engaging with the public through activities connected to sustainable consumption, skills sharing and education.

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Figures and Tables

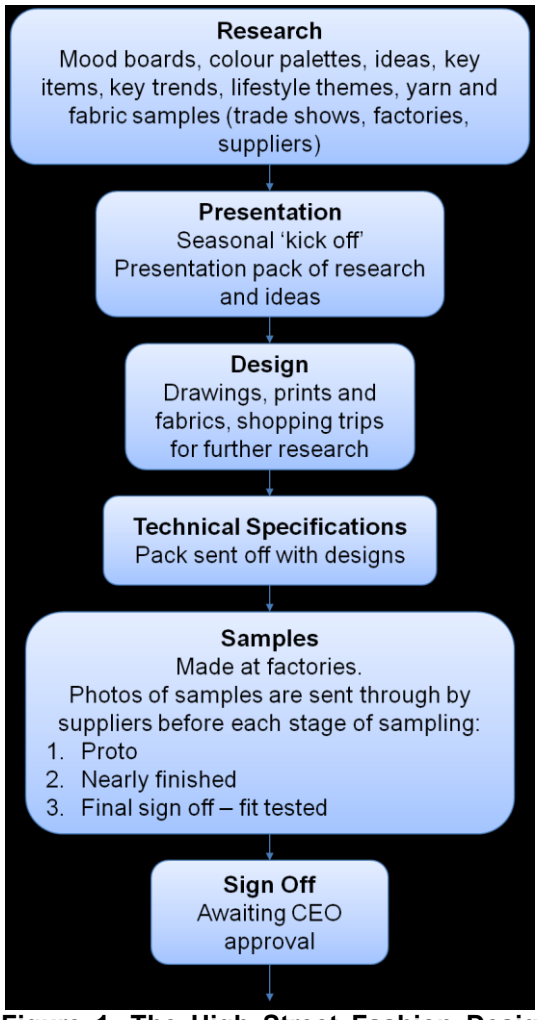

Figure 1. The High Street Fashion Design Process

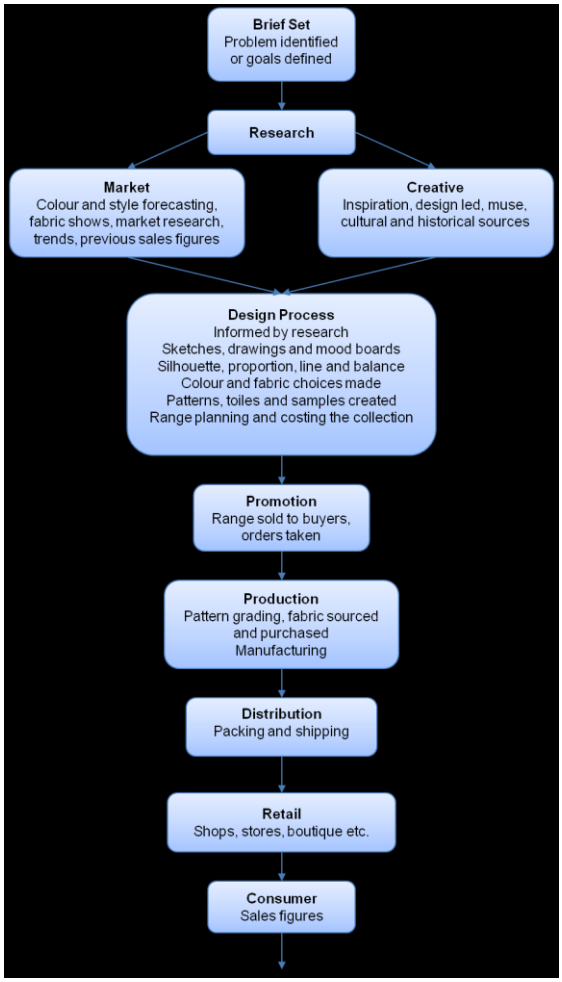

Figure 2. Summarised Standard Fashion Design Process Model
(Adapted from: McKelvey and Munslow (2003); Jenkyn Jones (2005); Burke (2008); Matharu (2010) and Armstrong and LeHew (2011))

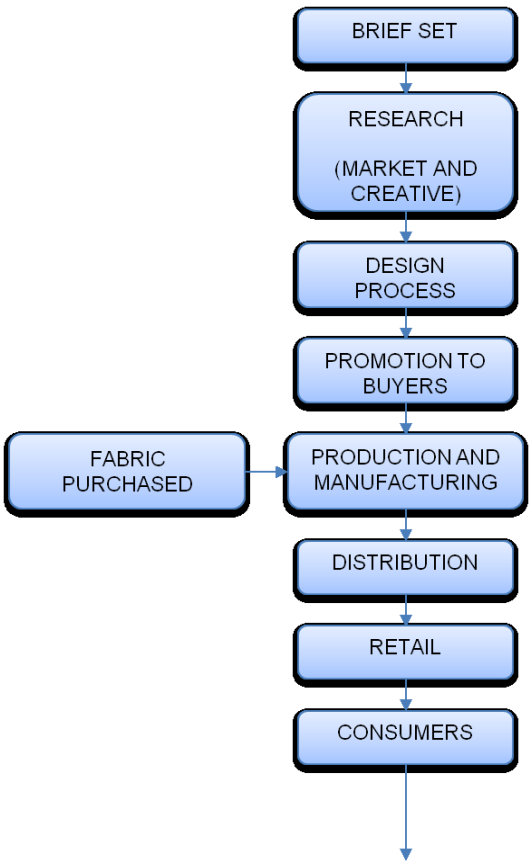

Figure 3. Abbreviated Standard Fashion Design Process Model

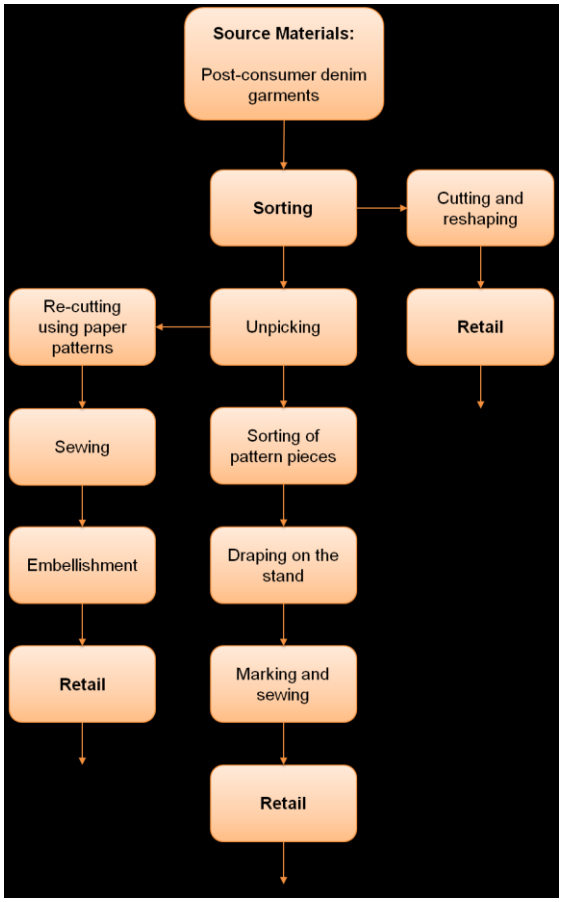

Figure 4. The Upcycled Denim Wear Process Model

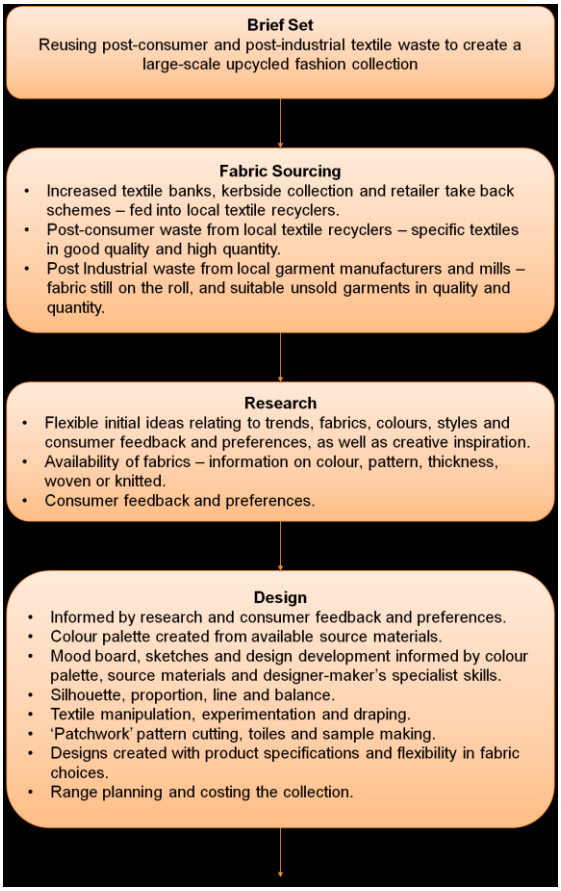

Figure 5 a. The Upcycled Fashion Design and Production Process Model

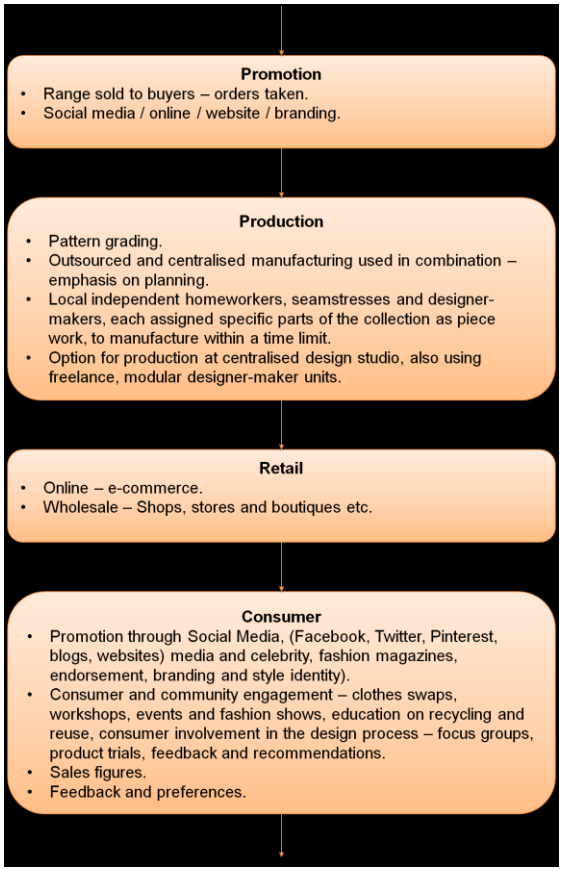

Figure 5 b. The Upcycled Fashion Design and Production Process Model

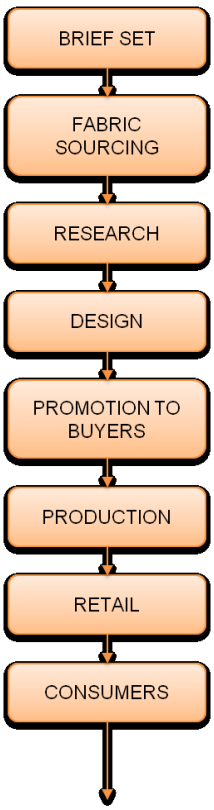

Figure 6. Abbreviated Upcycled Fashion Design and Production Process Model

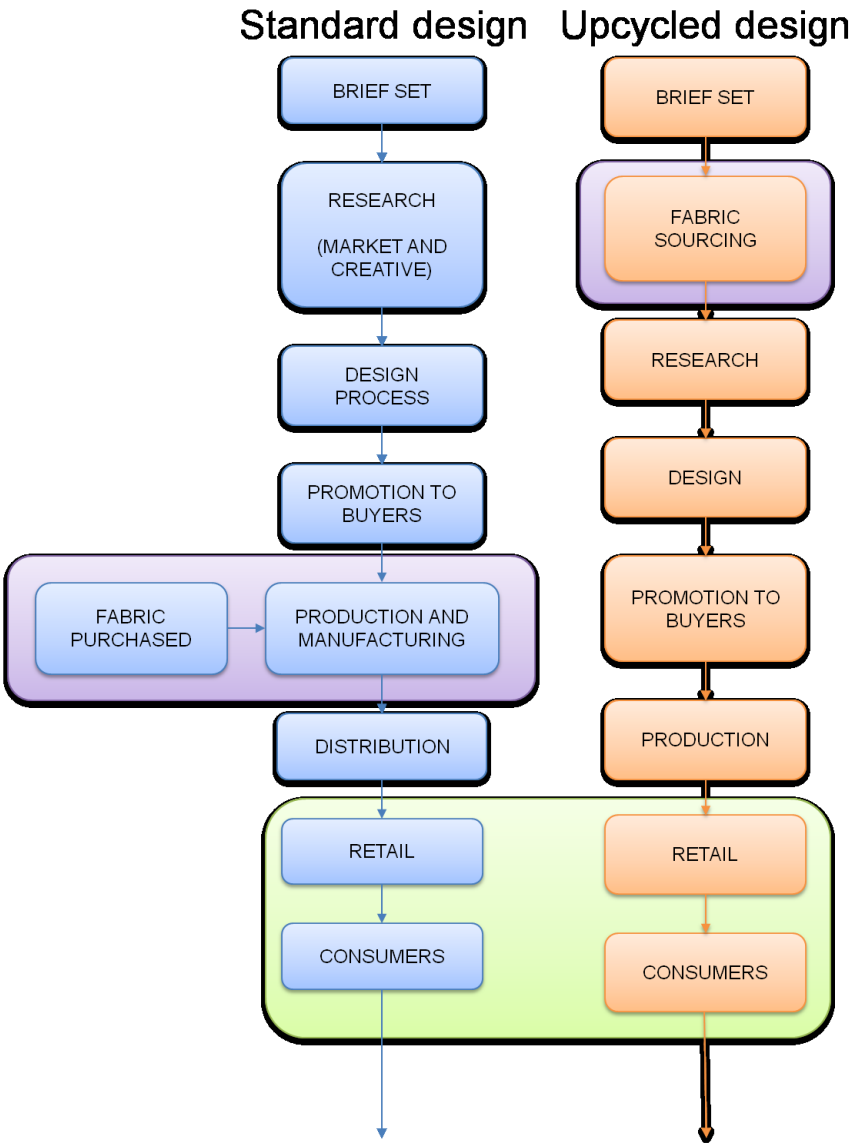

Figure 7. Standard Fashion Design vs. Upcycling